COMMONWEALTH OF AUSTRALIA

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Warning

CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 2, 2015

FINAL EXAMINATION	**DURATION**
ENG429 – Biomedical Engineering	Reading Time: **10** minutes Writing Time: **180** minutes

INSTRUCTIONS TO CANDIDATES

Please **do not use** pale fine blue pens or pencil, please **use** a dark blue or black pen

This paper consists of thirty five (35) questions. You are required to answer any twenty five (25) questions.

Each question is worth 4 marks. The total mark for this examination is 100.

EXAM CONDITIONS

This is an OPEN BOOK examination

Any non-programmable calculator is permitted

Any handwritten material is permitted

Any hard copy, dictionary is permitted (annotated allowed)

Answer on the supplied examination material/s only

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
Any printed material with the exception of CDU Library books	1 x 20 Page Book

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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Answer any 25 Questions.
Each question is worth 4 marks.

1. What is positron emission tomography?

2. What is the relevance of a stress strain curve for a biomaterial that is used to fix broken bones?

3. What are the main factors involved in the movement of ions across the cell membrane in the steady state solution?

4. List three factors which influence the strength of bone.

5. Which methods can be used to evaluate brain function?

6. What is the most common source of noise in ECG signals? Does this type of noise also affect other biological signals? Explain your answers.

7. In some diseases the myelin sheath of nerves is damaged resulting in a longer conduction time. Describe a method to measure the conduction time of a nerve.

8. Give an example of an application of a biomaterial where wear resistance is a very important property.

9. A new material has been implanted into a rabbit to test for biocompatibility. The site of implantation is examined at 5 days. The site is slightly red and swollen. What concerns does this raise about its biocompatibility?

10. Name two causes of heart murmurs.

11. What is the difference between therapeutic and assistive devices? Give an example of each.

12. What are the functions of the nervous system?

13. What is the purpose of a notch filter?

14. What is the purpose of a heater in an airflow transducer? In what way would the measurements change if it would not work?

15. Why is it necessary for the ventricular action potential to have a relatively long absolute refractory period?

16. What is the difference between invasive and non-invasive measurements? Give some examples of each.

17. Are cochlear implants suitable for all patients with hearing problems? Explain your answer.

18. What is the difference between soft and hard X-rays? What is the medical relevance of this difference?

19. How do calcium ions interact with the myofibrillar elements to cause muscle contraction?

20. What are the advantages and disadvantages of artificial heart valves compared to biological heart valves?

21. Give two examples of the application of ultrasound.

22. How does lithotripsy work?

23. Compare an artificial leg with a real leg and explain the limitations of the artificial leg.

24. What is a hardness test? Give an example of an application of a biomaterial for which this is a relevant test.

25. How can oxygen saturation be measured?

26. What is meant by the resolution of an AD converter?

27. What is a total hip replacement? What material characteristics are required for materials used in a total hip replacement?

28. The incidence of head injuries due to violence is relatively high in the Northern Territory. What methods can be used to evaluate the effect of these injuries?

29. What is the difference between continuous-time and discrete-time signals? Are most bio-signals continuous-time signals or discrete-time signals?

30. What material properties would be required for a tendon replacement?

31. What are the advantages of non-contact thermometers compared to contact thermometers?

32. Give some medical applications of electric stimulators.

33. Explain the relevance of evoked potentials for the testing of hearing.

34. Is the blood pressure the same everywhere in the body? If not, where does the highest blood pressure occur and where does the lowest blood pressure occur? Explain your answer.

35. Mention two vitamins which affect the strength of bone and indicate whether they affect the strength of bone in compression or in tension.